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FLOODPLAIN MANAGEMENT RECONNAISSANCE STUDY REPORT

CISSNA PARK IROQUOIS COUNTY



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VILLAGE OF CISSNA PARK
IROQUOIS COUNTY, ILLINOIS
FLOODPLAIN MANAGEMENT
RECONNAISSANCE STUDY

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Prepared By

U.S. Department of Agriculture
Soil Conservation Service
Champaign, Illinois

In cooperation with

STATE OF ILLINOIS

Department of Transportation
Division of Water Resources

September 1984



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VILLAGE OF CISSNA PARK

RECONNAISSANCE STUDY

INTRODUCTION

Use of floodprone areas can be a severe problem in Illinois. Urbanization and floodplain encroachment are increasing the severity of this problem. Over 800 communities in Illinois have been identified as having flooding problems.

The Illinois Division of Water Resources (DWR) is the responsible state agency for urban flood control and for setting priorities of flood studies within urban areas. The Soil Conservation Service is providing assistance to the Division of Water Resources in setting these priorities. A joint coordination agreement was executed between the Division of Water Resources, State of Illinois, and the USDA, Soil Conservation Service on April 30, 1976 and revised in December 1978 to furnish technical assistance in carrying out Flood Hazard Studies. These studies are carried out in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management," and under Section 6 of Public Law 83-566. A plan of study was executed in October 1983 for reconnaissance studies will utilize existing floodplain information, historical high water profiles, and the 100 year floodplain from flood insurance studies when available. Average annual damages are estimated for the structures within the floodplain.

This study was conducted and the report provided for the purposes of: 1) To evaluate needs for additional future studies, 2) to estimate average annual damages, 3) to provide an updated estimate of the 100 year floodplain and map, and 4) to provide guidance and recommendations to the community for improved floodplain management.



STUDY AREA DESCRIPTION

The Village of Cissna Park is located in Iroquois County, Illinois approximately 50 miles northeast of Champaign-Urbana. It is bisected by Illinois Route 49. The 1980 census population of Cissna Park was 825.

Pigeon Creek flows along the south and east sides of the village junctioning with Mud Creek approximately two miles northeast of the village. At this confluence the total drainage area for Pigeon and Mud creeks and their tributaries is approximately 120 square miles. Pigeon Creek has a drainage area of approximately 53 square miles. The creek upstream of Cissna Park is a well developed agricultural drainage network with over 100 feet of elevation difference between the village and the top of watershed near Clarence, approximately 7 miles to the southwest. The hydrologic basin number is 07120002-090.

The area around Cissna Park and the entire Pigeon Creek watershed is almost entirely used for row crop production. There are some small steep slopes near the creek channels that are mapped as Chatsworth silty clay which is a very slowly permeable soil formed in silty clay glacial till or lakebed sediments. The remainder of the watershed varies from the Rowe-Clarence association in the upper reaches to the Bryce-Swygert association in the lower reaches.

The Rowe-Clarence association can be generally described as being poorly or somewhat poorly drained, silty soils that formed in colluvial sediments,

loess, or silty material and in underlying glacial till. The Bryce-Swygert association consists of poorly and somewhat poorly drained, clayey and silty soils that formed in lacustrine deposits and the underlying glacial till.

More complete and detailed mapping and descriptions may be found in the Soil Survey of Iroquois County issued in October 1982. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It was made as part of the technical assistance provided to the Iroquois County Soil and Water Conservation District.

Natural Values

This area is fairly typical of agricultural areas in east-central Illinois. The vast majority of the upland areas are tilled to produce row crops. The predominant practices do not provide a great amount of wildlife habitat. The creek channels are sometimes bordered by narrow grassed strips that, if managed correctly, can provide significant habitat. Bottomlands that are frequently flooded are often left to grow in brush and trees while that flooded less frequently is often tilled for row crop production.



FLOOD PROBLEMS

Excess water problems in the Village of Cissna Park are generally from three sources. A naturally high water table results in wetness and seepage problems for any excavated structure. The pothole or ponding nature of the natural topography and poor definition of natural drainageways result in excess storm runoff being trapped and slowly released through natural or man-made drainage systems. The source causing the most severe damage to the village is Pigeon Creek and its tributaries.

As stated previously, Pigeon Creek and its tributaries is a well developed and maintained agricultural drainage network. The fact that the channels are hydraulically efficient provides great benefit to the landowners in the upland areas of the watershed. Storm runoff is quickly and efficiently delivered to the Cissna Park area.

Once the storm discharge reaches Cissna Park it is slowed by both natural and man-made restrictions and released slowly through a narrow, shallow, winding channel with a very flat gradient. The man-made restrictions are the railroad trestle, encroachment by diking and filling and the old route 49 bridge. Natural restrictions are mainly the decrease in gradient and channel cross section, the confluence of the two large creek systems, and brush filled creek bottom below the confluence.

Floods of varying magnitude on Pigeon Creek have been experienced in virtually every month during the year. Floods during the winter and early spring are affected significantly by melting snow cover and ice buildup at the

bridges and natural restrictions. Floods during the summer months are a direct result of intense thunderstorm activity typical of the Midwest. In fact, an intense thunderstorm covering only a portion of the watershed can result in Pigeon Creek overflows when the village has had little or no precipitation.

The flood of record for Pigeon Creek at Cissna Park occurred in 1927. Another large flood occurred in June 1956 as a result of a storm producing a reported eight inches of rain in three hours. This storm resulted in a large amount of damage mostly to contents of buildings. During June 1956, water overtopped county Highway 49 north of county Highway 46 and inundated areas along north 3rd and 4th Streets before running northeast past the high school toward the creek.

It is believed that the combination of the extremely intense rainfall and the old bridges in place at both the railroad and Route 49 crossings resulted in floodwater elevations that were higher than expected for the 100-year (1 percent) chance storm under present conditions.

Problem Summary

It is estimated that 93 residences are presently located within the 1 percent chance (100-year recurrence) floodplain. An additional 14 businesses are located within the same boundary.

Estimated average annual damage from Pigeon Creek flood water is as follows:

<u>Number of Structures</u>		<u>Total</u> <u>Values</u>	<u>Average Annual</u> <u>Damages</u>
<u>Houses &</u> <u>Trailers</u>	<u>Businesses</u>		
93	14 1/	\$4,681,000	\$40,300 1/

1/ Includes sale barn on Illinois Route 49, south of corporate limit.

In addition to damage to the structures referred to above, it is estimated that an additional \$2,000 damage occurs annually to yards. An estimated \$2,000 damage occurs annually to streets from a combination of flooding and ponding. It is estimated that flooding starts at the 10 year frequency storm.

Illinois Route 49 may be flooded 4 or 5 times in a 100-year period for several hours. No dollar amount was included for this due to its low frequency.

There are approximately 68 acres of undeveloped cropland within the corporate limits of Cissna Park that are flooded by the 1 percent chance flood. The estimated average annual damage to these agricultural areas is \$3,100.

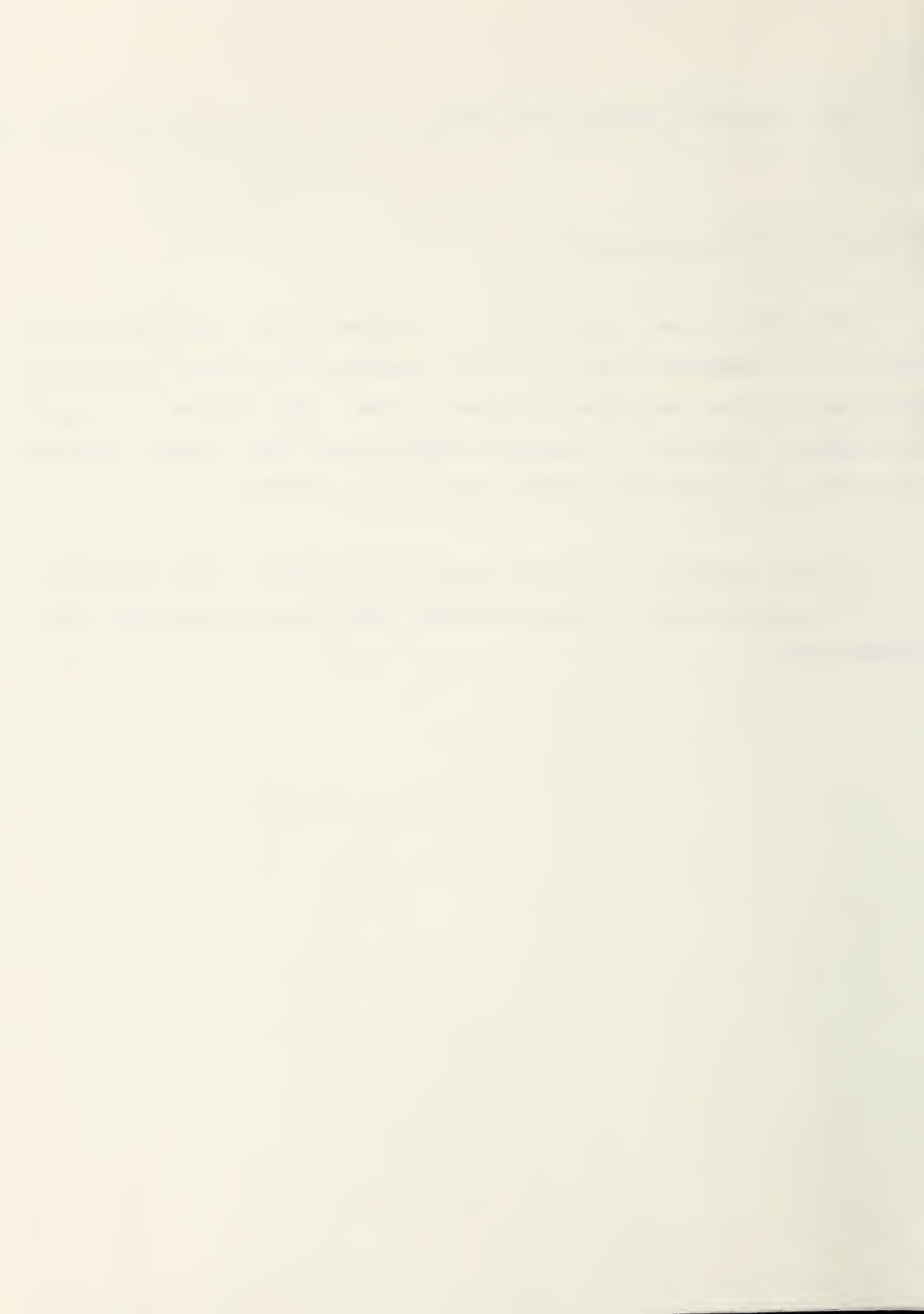


Total estimated average annual damage to the Village of Cissna Park is \$47,400.

Existing Floodplain Management

Cissna Park is participating in the National Flood Insurance Program (NFIP) in the emergency phase. The NFIP requires the village to regulate development in the identified flood hazard area. The village has apparently been doing so since their joining the NFIP in June 1975. Flood insurance is available to all home and business owners in the village.

Iroquois County is also participating in the NFIP. Flood insurance for home and business owners in unincorporated areas has been available since December 1973.



RECOMMENDATIONS

It is recommended that the village continue to regulate construction in the 1 percent chance flood hazard area. The village recognizes that the map published with this report will be used by the Flood Insurance Administration as the most current and accurate map available.

It is also recommended that more detailed hydrologic and hydraulic models be assembled to more accurately define the flood plain as well as provide needed water surface elevations. These models should extend to and probably go beyond the confluence of Pigeon and Mud creeks to evaluate the effect these downstream conditions have on Cissna Park.

A further analysis of levee and dike systems to protect the village from Pigeon Creek floods could be made. From the limited hydraulic evaluation completed as part of this study it was concluded that a dike and levee system to protect the entire Village of Cissna Park may not be economically feasible.

Conservation measures that might slow or store runoff such as good crop residue management, crop rotations, and terraces are being applied on some of the land in the watershed. These practices are being applied on a voluntary basis by landowners with technical assistance by the Soil Conservation Service through the Iroquois and Vermilion County Soil and Water Conservation Districts. The effectiveness of these practices in reducing flood damages in Cissna Park is probably too small to be significant at the current rate of application.



An alternative might be to lower or remove the railroad grade to existing floodplain elevation and enlarge the Pigeon Creek channel to Mud Creek. This alternative must be evaluated carefully and completely to establish its effect on flood elevations downstream. It would have very little impact on reducing damages from large flood events.

The Village of Cissna Park should continue to consider drainage patterns, and soil limitations when permitting new development. These are particularly important where buildings are planned to be partly excavated or have full basements.

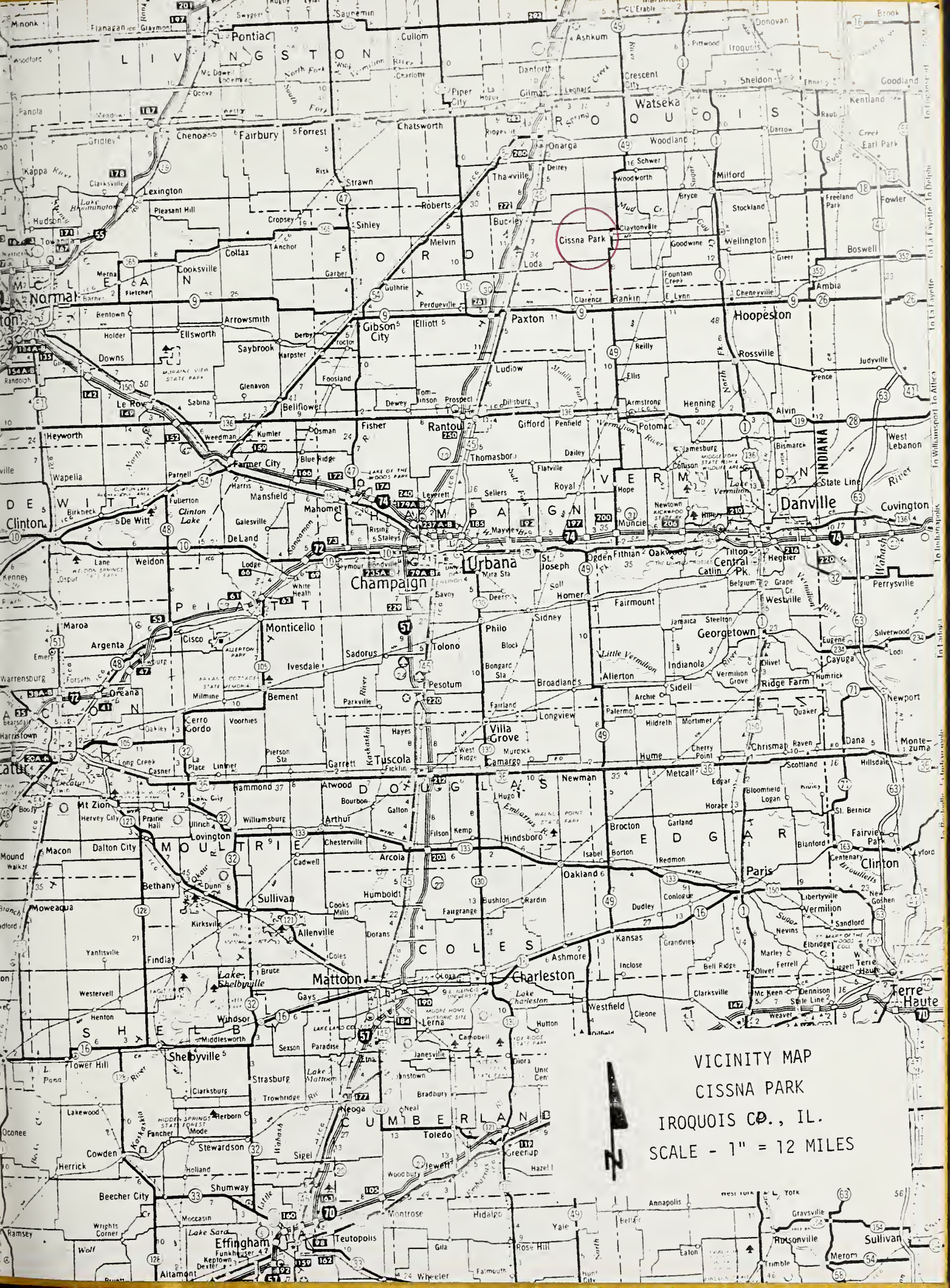
It is recommended that a lower priority be assigned to further detailed study of the Village of Cissna Park. This recommendation is based on the conclusion that the average annual damage is not large enough to economically justify the recommended alternatives.

INVESTIGATION AND ANALYSIS

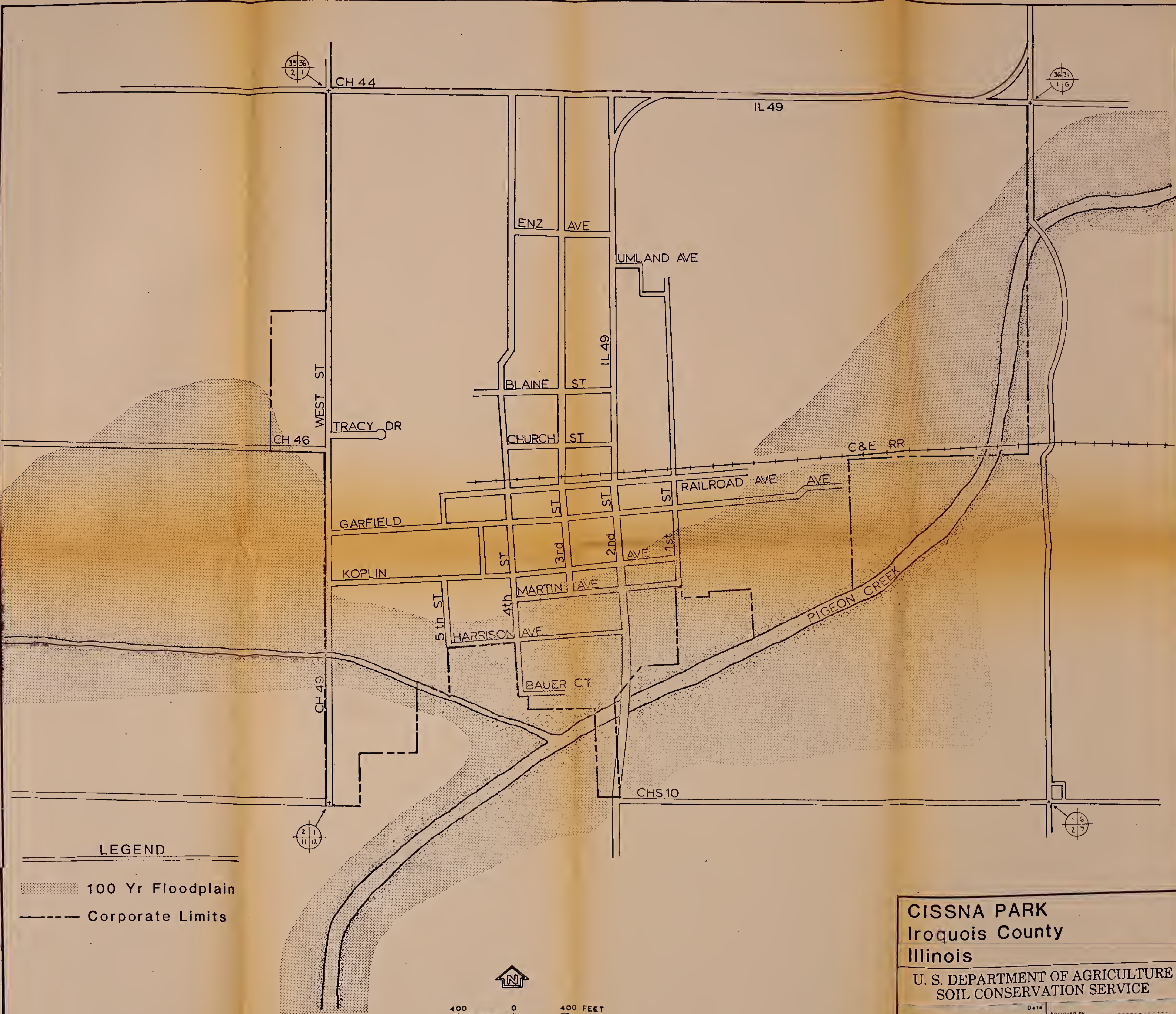
A limited hydraulic model was assembled for Pigeon Creek extending from just downstream of the railroad bridge to approximately one-quarter mile upstream of the west corporate limit. The model employed the standard step backwater computation procedure combined with the U.S. Bureau of Public Roads method for evaluating bridge hydraulics in WSP2. WSP2 is a computer program for hydraulic analysis developed by the Soil Conservation Service and published as Technical Release No. 61. The peak discharges for this analysis were estimated using the procedures described in U.S. Geological Survey, Water Resources Investigations 77-117, Technique for Estimating Magnitude and Frequency of Floods in Illinois and IDOT peak discharge estimates used in design of the new Illinois Route 49 crossing.

A large amount of information was provided by David Hahn, PE of Jerry Lacy and Associates, Inc., of Kankakee, Illinois. The IDOT - Division of Highways - District 3, Ottawa, Illinois, provided a set of as-built construction drawings for the Illinois Route 49 crossing. Aerial photographs were provided by the Division of Water Resources.

Damages were based on property value estimated during the field review and limited survey. Damage factors as percent of property value were applied to establish average annual damages. These factors have been developed during previous detailed floodplain management studies and are related to the frequency of damage for each property.



VICINITY MAP
CISSNA PARK
IROQUOIS CO., IL.
SCALE - 1" = 12 MILES



LEGEND

- 100 Yr Floodplain
- Corporate Limits

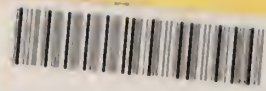


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APPROXIMATE SCALE

CISSNA PARK
Iroquois County
Illinois

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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